



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/646,527	08/22/2003	Kenneth S. Collins	6915 P07	8502

7590 09/18/2006

Patent Counsel, M/S 2061  
Legal Affairs Dept.  
Applied Materials, Inc.  
P.O. Box 450-A  
Santa Clara, CA 95035

EXAMINER

ARANCIBIA, MAUREEN GRAMAGLIA

ART UNIT PAPER NUMBER

1763

DATE MAILED: 09/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

8

## Office Action Summary

Application No.

10/646,527

Applicant(s)

COLLINS ET AL.

Examiner

Maureen G. Arancibia

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 July 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>02/06/08/06</u> | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Terminal Disclaimers***

1. The terminal disclaimers filed on 17 April 2006 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent Nos. 6,438,126; 6,468,388; 6,494,986; or 6,551,446; or co-pending U.S. Application Serial Nos. 10/646,458 or 10/646,533 have been reviewed and are accepted. The terminal disclaimers have been recorded.

### ***Specification***

2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: Specifically, the recitation in Claims 1 and 22 of an "insulating layer insulating said conductive insert from said conductive base plate" lacks antecedent basis in the specification.

### ***Claim Objections***

3. **Claims 24 and 25 are objected to because of the following informalities:** it appears that Line 5 of Claim 24 should be corrected to read "lift pin assembly and said *conductive wafer support plate*." Claim 25 is objected to due to its dependence on Claim 25. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Art Unit: 1763

**5. Claims 1-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

Specifically, the terms "high dielectric filler" and "high breakdown voltage" in claims 1, 22, 24, and 25 are relative terms which render the claims indefinite. The terms "high dielectric filler" and "high breakdown voltage" are not defined by the claims, the specification does not provide standards for ascertaining the requisite degrees, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. For the purposes of the following examination on the merits, "a high dielectric filler having a high breakdown voltage" has been interpreted as referring to a dielectric material. The remaining claims are rejected due to their dependence on independent claims 1 or 22. Clarification and/or correction are required.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

Art Unit: 1763

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**8. Claims 1-4, 6-13, 17, 18, and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,321,134 to Henley et al. (from Applicant's IDS) in view of U.S. Patent 6,432,260 to Mahoney et al.; U.S. Patent 5,542,559 ('559) to Kawakami et al. (from Applicant's IDS); and U.S. Patent Application Publication 2002/0036881 to Shamouilian et al.**

In regards to Claims 1, 22, and 23, Henley et al. teaches a system for processing a workpiece, comprising: (A) a plasma immersion ion implantation (PIII) reactor (Figure 4), comprising: an enclosure 422 comprising a side wall and a ceiling and defining a chamber 414; a workpiece support pedestal 465 within the chamber having a workpiece support surface facing said ceiling and defining a process region extending generally across said wafer support pedestal; an inductively coupled source power applicator 440; and an RF plasma source power generator 466 coupled to said inductively coupled source power applicator for inductively coupling RF source power into said process zone; (B) a second wafer processing apparatus (Column 4, Lines 18-40; Column 6, Lines 18-27); and (C) a wafer transfer apparatus 20 for transferring said workpiece between said plasma immersion ion implantation reactor and said second wafer processing apparatus. (Figures 1 and 3)

In regards to Claims 1, 13, and 22, Henley et al. does not teach a gas distribution apparatus or a hollow conduit outside of the chamber having first and second ends

connected to respective openings in the chamber at opposite sides of the process region, so as to provide a first reentrant path, or that the plasma comprises a plasma current in said reentrant path that oscillates at an RF frequency of the RF plasma source power applicator.

Mahoney et al. teaches a plasma reactor (Figure 1), comprising: an enclosure 2 comprising a side wall and a ceiling and defining a chamber (Figure 1); a workpiece support pedestal 17 within the chamber having a workpiece support surface facing said ceiling and defining a process region extending generally across said wafer support pedestal and confined laterally by said side wall and axially between said workpiece support pedestal and said ceiling; said enclosure having a first pair of openings at generally opposite sides of said process region (Figure 1); a first hollow conduit 1 outside of said chamber having first and second ends connected to respective ones of said first pair of openings, so as to provide a first reentrant path extending through said conduit and across said process region; a gas distribution apparatus 16 on a side wall of the reactor connected to gas supply 15 for introducing a process gas; and a first RF plasma source power applicator 10 for generating a plasma in the chamber. The plasma comprises a plasma current 13 in said reentrant path that oscillates at an RF frequency of said first RF plasma source power applicator. (Column 6, Lines 31-36)

It would have been obvious to one of ordinary skill in the art to modify the reactor taught by Henley et al. to include the gas distribution apparatus taught by Mahoney et al., and to replace the inductive plasma generating means taught by Henley et al. with the hollow conduit, power applicator, and reentrant path taught by Mahoney et al. The

motivation for providing a gas distribution apparatus, as taught by Mahoney et al. (Column 6, Lines 40-46), would have been to supply working gases to the reactor to be excited by the plasma discharge. The motivation for providing the hollow conduit, power applicator, and reentrant path as taught by Mahoney et al. (Column 3, Line 1 - Column 4, Line 14), would have been to have an inductively coupled plasma with a high coupling coefficient without making use of dielectric vacuum wall materials, with their undesirable thermal mechanical characteristics.

The gas distribution apparatus taught by the combination of Henley et al. and Mahoney et al. would be inherently capable of introducing process gas containing a first species to be ion implanted into a layer of the workpiece. Also, the plasma reactor taught by the combination of Henley et al. and Mahoney et al. would still be capable of performing plasma immersion ion implantation, based on the process settings. This rejection is based on the fact the apparatus structure taught above has the inherent capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

The combination of Henley et al. and Mahoney et al. does not expressly teach the features of the workpiece support pedestal as recited in Claims 1, 17, and 22.

'559 to Kawakami et al. teaches a workpiece support pedestal comprising a conductive wafer support plate 31 (Column 5, Lines 19-20); a grounded conductive base plate forming at least a void between said support and base plates; and a side wall around said support and base plates forming at least a void between said side wall and

Art Unit: 1763

said support and base plates (*conductive grounded component 41 forms both a base plate and side wall, as broadly recited in the claim*; Column 5, Lines 19-33); dielectric filler material 4 filling said void (Column 5, Lines 27-29); an electrostatic chuck (Column 5, Lines 21-23); and thermal control apparatus (*cooling medium reservoir 35*) for workpiece temperature control (Column 5, Lines 24-27). (Figure 1)

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by the combination of Henley et al. and Mahoney et al. to use the workpiece support pedestal as taught by '559 to Kawakami et al., as an art-recognized equivalent means for supporting the workpiece to be processed (ex. '559 to Kawakami et al., Column 5, Lines 16-23). It has been held that an express suggestion to substitute one equivalent component or process for another is not necessary to render such substitution obvious. *In re Fout*, 675 F.2d 297, 213 USPQ 532 (CCPA 1982).

The combination of Henley et al., Mahoney et al., and '559 to Kawakami et al. does not expressly teach the bias power coupling structure recited in Claims 1 and 22.

Shamouilian et al. teaches a workpiece support pedestal (Figures 6 and 8a) comprising a conductive insert 345 coupled to a bias power generator 145 and a conductive female receptacle 375 for tightly receiving said conductive insert, said conductive female receptacle being connected to a conductive wafer support plate 105, said conductive insert and conductive female receptacle extending through a base plate 190 to the conductive wafer support plate 105, and an insulating layer 380 insulating the conductive insert from the base plate. (Paragraphs 27, 70, 71)

It would have been obvious to one of ordinary skill in the art to modify the workpiece support pedestal taught by the combination of Henley et al., Mahoney et al., and '559 to Kawakami et al. to include the bias power coupling structure as taught by Shamouilian et al. The motivation for making such a modification, as taught by Shamouilian et al. (Paragraphs 68-71), would have been to form a reliable connection between the bias power generator and the conductive wafer support plate while electrically isolating the power supplying member from the other components of the chuck.

The combination of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. just discussed does not expressly teach the lift pin assembly recited in Claim 24.

However, Shamouilian et al. further teaches that the workpiece support pedestal further comprises at least one lift pin assembly (lift pins 160a, 160b) which extends through base plate 190 and conductive wafer support plate 105, as broadly recited in the claim (Figure 6), an axial void between the lift pin assembly and the conductive wafer support plate, and a dielectric filler material 380 within the void. (Figure 6; Paragraph 71)

It would have been obvious to one of ordinary skill in the art to further modify the combination of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. to include the lift pin assembly as taught by Shamouilian et al. The motivation for doing so, as taught by Shamouilian et al. (Paragraphs 28 and 71), would have been to

Art Unit: 1763

provide lift pins to raise and lower the workpiece from the pedestal, while preventing the formation of a plasma glow discharge within the holes through which the lift pins extend.

In regards to Claim 2, Henley et al. teaches a cleaning species source plasma reactor 24 (Column 11, Line 60 - Column 12, Line 7), which would inherently comprise a source of cleaning species precursor gases in order to be able to generate a plasma. Henley et al. also teaches a passage (*wafer transfer chamber*, Figure 3) coupling said cleaning plasma reactor to the plasma immersion ion implantation reactor.

In regards to Claims 3 and 4, the particular type of gas used is a process limitation rather than an apparatus limitation, and the recitation of a particular type of gas does not limit an apparatus claim, see *In re Casey*, 152 USPQ 235; *In re Rishoi*, 94 USPQ 71; *In re Young*, 25 USPQ 69; *In re Dulberg*, 129 USPQ 348; *Ex parte Thibault*, 64 USPQ 666; and *Ex parte Masham*, 2 USPQ2d 1647. This rejection is based on the fact the apparatus structure taught by Henley et al. has the inherent capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

In regards to Claim 6, Henley et al. teaches that the processing system can comprise an ion beam implantation apparatus (Column 14, Lines 25-26).

While Henley et al. does not expressly teach that the processing system can include both the PIII apparatus and an ion beam implantation apparatus, it would have been obvious to one of ordinary skill in the art to include both of these apparatuses in

Art Unit: 1763

the system. The motivation for doing so would have been to perform further processing on the workpiece.

Such a system would be inherently capable of implanting a second species into a layer of the workpiece. This rejection is based on the fact the apparatus structure taught above has the inherent capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

In regards to Claim 7, the inclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims. *In re Young*, 75 F.2d 966, 25 USPQ 69 (CCPA 1935) (as restated in *In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963)). Also, the particular types of species to be implanted are process limitations rather than apparatus limitations, and the recitation of which does not limit an apparatus claim, see *In re Casey*, 152 USPQ 235; *In re Rishoi*, 94 USPQ 71; *In re Young*, 25 USPQ 69; *In re Dulberg*, 129 USPQ 348; *Ex parte Thibault*, 64 USPQ 666; and *Ex parte Masham*, 2 USPQ2d 1647. This rejection is based on the fact the apparatus structure taught by Henley et al. and Mahoney et al. has the inherent capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

In regards to Claim 8, it has been held that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). Moreover, a second PIII reactor would be

Art Unit: 1763

capable of implanting any species into a layer of the workpiece. This rejection is based on the fact the apparatus structure taught by Henley et al. and Mahoney et al. has the inherent capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

In regards to Claim 9, see the discussion of Claim 7.

In regards to Claim 10, Henley et al. teaches an anneal chamber 303. (Column 12, Lines 8-16)

In regards to Claim 11, the plasma etching chamber 301 taught by Henley et al. (Column 12, Lines 45-51) would be capable of stripping a photoresist. This rejection is based on the fact the apparatus structure taught by Henley et al. and Mahoney et al. has the inherent capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

In regards to Claim 12, Henley et al. teaches a wet clean chamber 305. (Column 17, Line 53 - Column 18, Line 12)

In regards to Claim 18, Henley et al. does not expressly teach a bias source coupled to the workpiece support.

Mahoney et al. teaches that an RF bias power generator can be coupled to the workpiece support. (Column 6, Lines 46-47)

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by Henley et al. to include an RF bias power generator, as taught by

Mahoney et al. The motivation for making such a modification, as taught by Mahoney et al. (Column 6, Lines 46-49), would have been that biasing is appropriate for conventional plasma processing.

Further in regards to Claims 22 and 23, again, it has been held that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

**9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Henley et al. in view of Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. as applied to Claim 1 above, and further in view of U.S. Patent 6,643,557 to Miller et al.**

The teachings of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. were discussed above. Henley et al. additionally teaches a process controller 31.

The combination of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. does not expressly teach an optical metrology chamber for obtaining a measurement of ion implantation in a workpiece, and coupled to the process controller.

Miller et al. teaches an optical metrology chamber 150 (Column 4, Lines 44-48) for obtaining a measurement of ion implantation in a workpiece (Column 8, Lines 34-37) and coupled to a process controller 130.

It would have been obvious to one of ordinary skill in the art to modify the combination of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian

et al. to include an optical metrology chamber coupled to the process controller. The motivation for doing so, as taught by Miller et al. (Column 8, Lines 36-39), would have been to allow for adjustment of ion implantation dosage on subsequent ion implantation processes.

**10. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Henley et al. in view of Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. as applied to Claim 1, and further in view of U.S. Patent 6,150,628 to Smith et al. (from Applicant's IDS).**

The teachings of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. were discussed above.

The combination of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. discussed above does not expressly teach the limitations of Claim 14.

Mahoney et al. additionally teaches that the first hollow conduit comprises a metal material. (Column 6, Lines 15-16)

It would have been obvious to one of ordinary skill in the art to modify the combination of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. to have the first hollow conduit comprise metal. The motivation for making such a modification, as taught by Mahoney et al. (Column 4, Lines 20-22), would have been to use an easily cooled material.

The combination of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. does not expressly teach an annular insulating gap in the first hollow conduit separating the hollow conduit into axial sections.

Smith et al. teaches an annular insulating gap 116 in a metallic hollow conduit 100 separating the hollow conduit into axial sections. (Figure 3)

It would have been obvious to one of ordinary skill in the art to modify the hollow conduit taught by the combination of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. to comprise an annular insulating gap, as taught by Smith et al. The motivation for making such a modification, as taught by Smith et al. (Column 8, Lines 3-27), would have been to prevent induced current flow from forming in the wall of the hollow conduit (*the plasma chamber itself*).

**11. Claims 15, 16, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henley et al. in view of Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. as applied to Claims 1 and 18 above, and further in view of U.S. Patent 5,571,366 to Ishii et al.**

The teachings of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. were discussed above.

In regards to Claims 15 and 16, the combination of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. does not expressly teach the claimed features of the reactor.

Ishii et al. teaches that the gap between the ceiling of a chamber and a wafer support pedestal 4 can be adjustable by use of pedestal elevating mechanism 78.

(Figure 14)

It would have been obvious to one of ordinary skill in the art to modify the reactor taught by the combination of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. to have the gap between the ceiling of a chamber and a wafer support pedestal be adjustable, as taught by Ishii et al. The motivation for making such a modification, as taught by Ishii et al. (Column 11, Lines 61-67), would have been to allow the surface to be processed to be moved to a space having an optimum plasma density distribution.

In the apparatus taught by the combination of Henley et al., Mahoney et al., '559 to Kawakami et al., Shamouilian et al., and Ishii et al., the ceiling would be inherently capable of comprising a constriction of the reentrant toroidal path in the process zone for enhancement of plasma ion density, and the gap between the ceiling and the pedestal would be inherently capable of being sufficiently small so that the plasma ion density of the plasma current would be greater in the vicinity of the pedestal than elsewhere along the reentrant path, simply by adjusting the gap to be smaller. This rejection is based on the fact the apparatus structure taught above has the inherent capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

In regards to Claims 19-21, the combination of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. as applied to Claim 18 teaches an RF bias coupled to the workpiece support, but does not expressly teach the RF bias power frequency.

Ishii et al. teaches an inductively coupled plasma apparatus (Figure 1), comprising an RF bias generator 19 having an RF bias frequency of about 2 MHz coupled to a workpiece support pedestal 4. (Column 5, Line 56 - Column 6, Line 16)

It would have been obvious to one of ordinary skill in the art to modify the reactor taught by the combination of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. to have an RF bias frequency of about 2 MHz coupled to the workpiece support pedestal. The motivation for including an RF bias generator with a frequency of about 2 MHz coupled to the workpiece support pedestal, as taught by Ishii et al. (Column 5, Lines 57-62), would have been to effectively emit the flow of the plasma onto the target surface of the workpiece.

The RF bias with a frequency of about 2 MHz coupled to the workpiece support pedestal taught by the combination of Henley et al., Mahoney et al., '559 to Kawakami et al., Shamouilian et al., and Ishii et al. would inherently be structurally capable of meeting the limitations of Claims 19-21, depending on the other process settings of the plasma reactor. This rejection is based on the fact the apparatus structure taught above has the inherent capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

**12. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Henley et al. in view of Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. as applied to Claim 24 above, and further in view of 6,558,508 ('508) to Kawakami et al. and U.S. Patent Application Publication 2002/0053513 to Stimson et al.**

The teachings of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. were discussed above.

The combination of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. does not expressly teach a fastening bolt as recited in Claim 25.

'508 to Kawakami teaches that a fastening bolt 34 is provided through all of the plates comprising a workpiece support pedestal 3. (Figure 2)

It would have been obvious to one of ordinary skill in the art to modify the workpiece support pedestal taught by the combination of Henley et al., Mahoney et al., '559 to Kawakami et al., and Shamouilian et al. to provide a fastening bolt through all of the plates comprising the workpiece support pedestal, as taught by '508 to Kawakami et al. The motivation for making such a modification, as taught by '508 to Kawakami et al. (Column 5, Lines 59-63), would have been to make the plates comprising the workpiece support pedestal freely removable from one another.

The combination of Henley et al., Mahoney et al., '559 to Kawakami et al., Shamouilian et al., and '508 to Kawakami et al. does not expressly teach that a dielectric material surrounds a portion of the bolt within the conductive wafer support plate.

Stimson et al. teaches that a fastening bolt 420 that is "RF hot" should be partially surrounded by partially surrounded by dielectric material 422 (Figure 4; Paragraph 30).

It would have been obvious to one of ordinary skill in the art to further modify the workpiece support pedestal taught by the combination of Henley et al., Mahoney et al., '559 to Kawakami et al., Shamouilian et al., and '508 to Kawakami et al. to surround the portion of the bolt within the conductive wafer support plate, which bolt would be "RF hot" due to the RF bias power supply connected to the conductive wafer support plate, with dielectric material. The motivation for doing so, as taught by Stimson et al. (Paragraph 30), would have been to guard against electrical contact between the bolt and another conductor.

### ***Response to Arguments***

13. Applicant's arguments filed 12 July 2006 have been fully considered but, to the extent to which they still apply in view of the new grounds of rejection, they are not persuasive.

Specifically, in response to Applicant's arguments against the references individually (namely Smith et al. and Ishii et al.), one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to Applicant's argument that Ishii et al. has a different reason for changing the height of the workpiece support pedestal than Applicant's desire to

constrict the cross-sectional area of the toroidal path, the fact that Applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

### ***Conclusion***

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

Art Unit: 1763

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Maureen G. Arancibia  
Patent Examiner  
Art Unit 1763



Parviz Hassanzadeh  
Supervisory Patent Examiner  
Art Unit 1763